

Flow-Through Raceways

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Flow-through Raceways

- Need large quantities of good quality water
- Functions as a mechanical system rather than biological
- Inflowing water provides O_2 and metabolic wastes are carried out by effluent
- Water quality gradient down long axis of raceway
- Production is high per unit space
- Overall management of fish easier
- Commercial viability requires gravity flow
- Large volume of dilute effluent needs treatment
- Discharge is regulated

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Production System

- Combined in-series & parallel raceways
- Average 4-6 uses for trout; up to 17 uses for warmwater species
- Turnover rate 3-6/hour trout; 13-18/hour warmwater

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Passive Aeration

Vertical drop ranges from 0.5 – 4 feet
Splash boards and other devices used to break up the water

Farm	1	2	3	4	5
Raceway flow (gpm)	251	1,585	1,401	2,645	2,694
Farm flow (gpm)	1,437	15,401	50,737	42,835	134,700
Load (lb/gpm)	13.4	36	11.7	15	12.5
Fish density (lb/ft^3)	2.37	1.69	2.00	3.18	2.31
Production (lb/CFS) (20,000)	15,927	29,268	19,937	25,221	23,347
Water use (gal/lb) (11,744)	14,889	8,086	11,844	9,375	10,112
Annual production (million lb)	0.05	1.00	2.25	2.40	7.00

Trout Facility Characterization: True et al. 2004

CFS = cubic feet per second; 1 CFS = 449 gpm

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Farm/year	ID-1 2004	ID-1 2005	ID-2 2004	ID-2 2005	ID-3 2004	ID-4 2004
Begin (fish/lb)	162	168	45	46	146	86
Harvest (fish/lb)	0.66	0.58	0.83	0.48	0.96	0.92
Days	363	300	369	419	278	352
Growth (g/day)	1.89	2.60	1.46	2.23	1.69	1.39
FCR	1.60	1.32	0.94	0.85	1.27	0.93
Survival %	87	71	72	81	49	72

Trout Production Indices – Yield Verification

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Warm Water Raceways

- Estimated production is 40,000 lb/CFS
- Fish density 5-10 lb/ft^3
- Generally more water uses and higher turnover rates compared to trout
- Tilapia and Catfish

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Waste Management

- Begins with high quality feed and low FCR
- Solids are captured and removed using settling basins
- Settling basin design is based on “overflow rate” – volume of water flow per unit time divided by the surface area of the settling basin – usually expressed as a velocity
- Solids with a settling velocity $\geq$ to the overflow rate will settle out

Demand feeders are commonly used to deliver feed

Advantages include:

- reduced labor
- access for all fish
- spreads oxygen demand throughout the day

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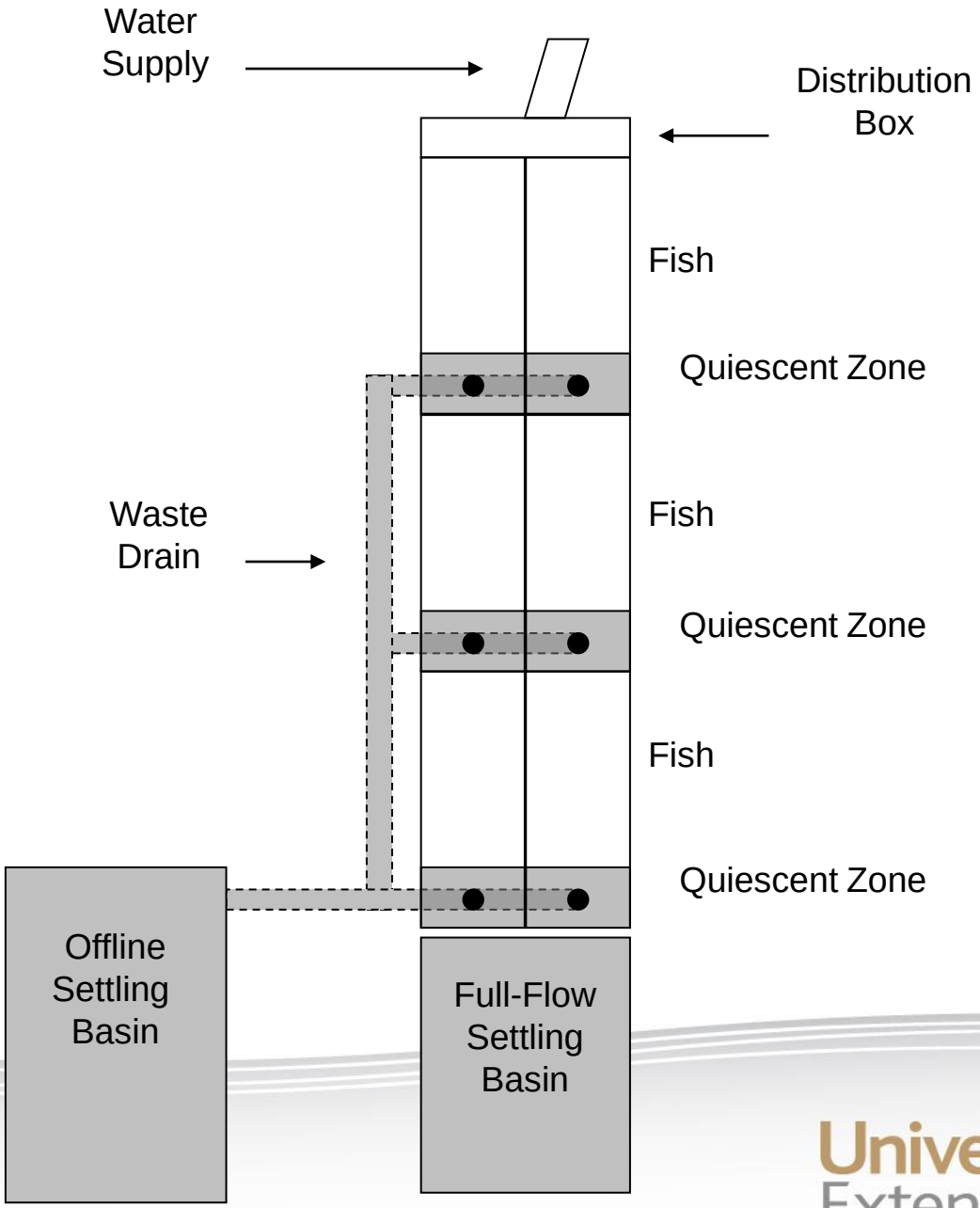

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Discharge is regulated by National Pollutant Discharge Elimination System Permit


http://www.extension.org/pages/58770/raceways